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Serpulid Polychaetes from Tanega-shima, Southwest Japan

By

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今島 実* : 種子島周辺海域のカンザシゴカイ類

A benthic survey was carried out around Tanega-shima, in June, 1975, by the National Science Museum, Tokyo, for the Natural History Research Project of the Japanese Islands. The island Tanega-shima lies about 60 Km south of the southern tip of Kyushu, and this area is influenced by the warm Kuroshio current.

The calcareous tubes of serpulids are attached to rocks, corals, shells, and other hard objects. There is no previous account of these worms from this area. The specimens were collected by hand in the intertidal zone and by dredging from depths ranging from 40 to 95 m around the island. In the present study 13 species in six genera are recognized. The material includes two new species of the genus *Hydroides*; five species, viz.: *Hydroides tambalagamensis*, *H. externispina*, *H. minax*, *H. albiceps* and *Metaveremia acanthophora* are new to the Japanese fauna.

The author is deeply indebted to Dr. H.A. ten HOVE of the Zoölogisch Laboratorium, Utrecht, Netherlands and Dr. Helmut ZIBROWIUS of the Station Marine d'Endoume et Centre d'Océanographie, Marseille, France, for critically reading the manuscript and for valuable suggestions of the taxonomic problems. He wishes to express his thanks to Mr. Akira MACHIDA for various arrangements in this survey.

Holotype and other specimens are deposited in the National Science Museum, Tokyo.

***Hydroides tambalagamensis* PILLAI, 1961**

(Fig. 2, a-j)

Hydroides tambalagamensis PILLAI, 1961, pp. 36-38, fig. 12, A-G; STRAUGHAN, 1967, p. 33, fig. 3g.

Material examined. Anno (1), Shimamazaki (4), Sumiyoshi (2) underside of corals on reef; Urata, on shell of pearl-oyster, *Pinctada margaritifera* (1); off Nishinoomote Harbour, in 30 m (2).

Description. A complete specimen measures about 13 mm in length and about 1 mm in width in the thorax; it consists of 96 segments. The body has dark brown pigmented patterns along the dorsal margin of the thoracic membranes, the ventral side of the thorax,

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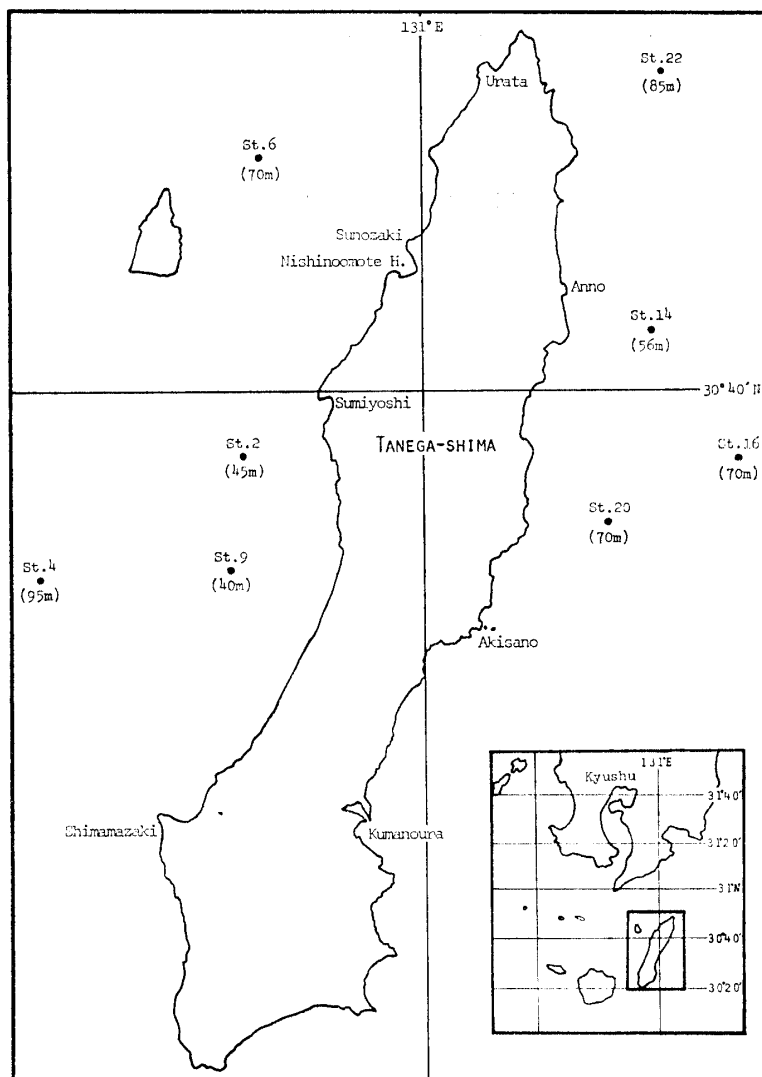


Fig. 1. Map of Tanega-shima and its surrounding area, showing the location and the depth of stations.

the anterior part of all thoracic and abdominal uncinigerous tori; there is a wide less pigmented zone between the narrow, pigmented transverse abdominal bands.

The branchiae have 11 to 13 gill-radioles on either side; in addition there is an operculum on the left or right and a rudimentary operculum at the opposite side. The gill-radioles end distally in a moderately long pinnule.

The peduncle is slender and cylindrical. The opercular funnel has 27 to 37 outwardly curved, sharply pointed radii; the distal half is brownish, and the tips of all radii are dark brown. The opercular crown has 6 to 8 subequal dark brownish spines. Each spine is curved outwards; it has a pair of outwardly curved lateral spines at about half its length, an inwardly curved radial spine at the same level or slightly above, and a small basal radial spine (Figs. a, b, c).

The collar is large and consists of one ventral lobe and two latero-dorsal ones, which

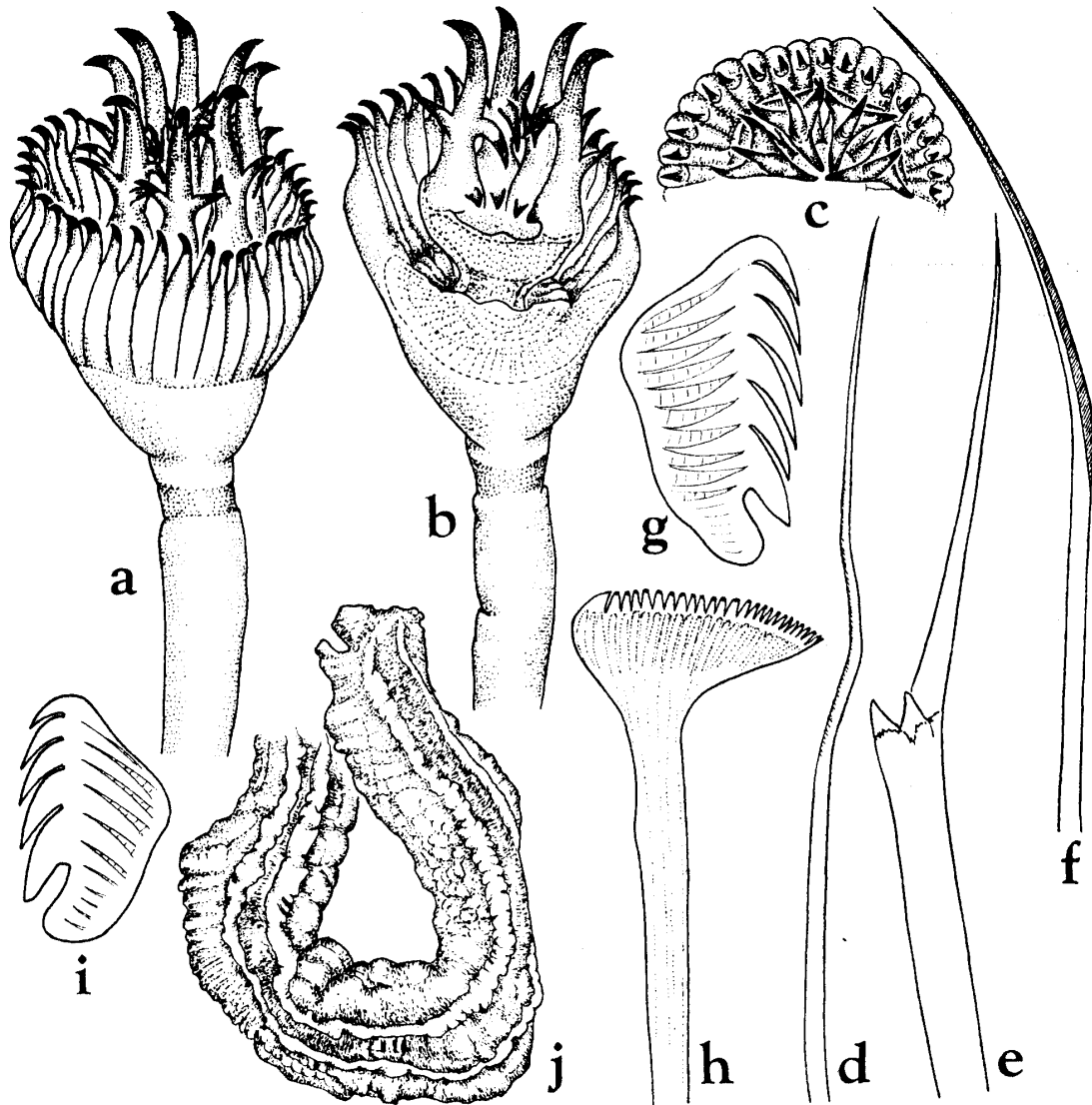


Fig. 2. *Hydroides tambalagamensis* PILLAI. a. Operculum, $\times 50$; b. Operculum, half of both funnel and crown removed, $\times 50$; c. A half operculum viewed from above, $\times 50$; d. Collar seta, $\times 195$; e. Capillary collar seta, $\times 195$; f. Thoracic seta, $\times 265$; g. Thoracic uncinus, $\times 900$; h. Abdominal seta, $\times 900$; i. Abdominal uncinus, $\times 900$; j. Tube, $\times 8$.

are continuous with the wide thoracic membranes. The thorax has 7 segments, 6 of which are uncinigerous. The collar setae are of two types: minutely serrated capillaries (Fig. d) and bayonet-shaped setae with two large teeth and a striated subapical zone (Fig. e). The remaining thoracic setae are limbate capillaries (Fig. f); the thoracic uncini have 6 teeth, the anteriormost is the largest (Fig. g). Abdominal setae are trumpet-shaped distally, with about 30 minute teeth in one row (Fig. h); the abdominal uncini are similar to those of the thorax, but are smaller and have 5 teeth each (Fig. i).

The tube is white; it is sub-trapezoidal in cross-section with two longitudinal ridges and some indefinite growth rings (Fig. j). It is 2 mm in diameter near the mouth.

The species is new to the Japanese fauna.

Distribution. Tambalagam Lake, Sri Lanka (Ceylon); Heron Island, Australia; Japan.

***Hydroides externispina* STRAUGHAN, 1967**

(Fig. 3, a-k)

Hydroides externispina STRAUGHAN, 1967, pp. 31-33, fig. 3a-f.

Material examined. Dredge sta. 6 (9).

Description. A complete specimen measures 13 mm in length and about 0.8 mm in width in the thorax; it consists of 85 segments.

The branchiae have 11 to 12 gill-radioles arranged in a semi-circle on either side; in addition there is an operculum on the left side. The gill-radioles end distally in a

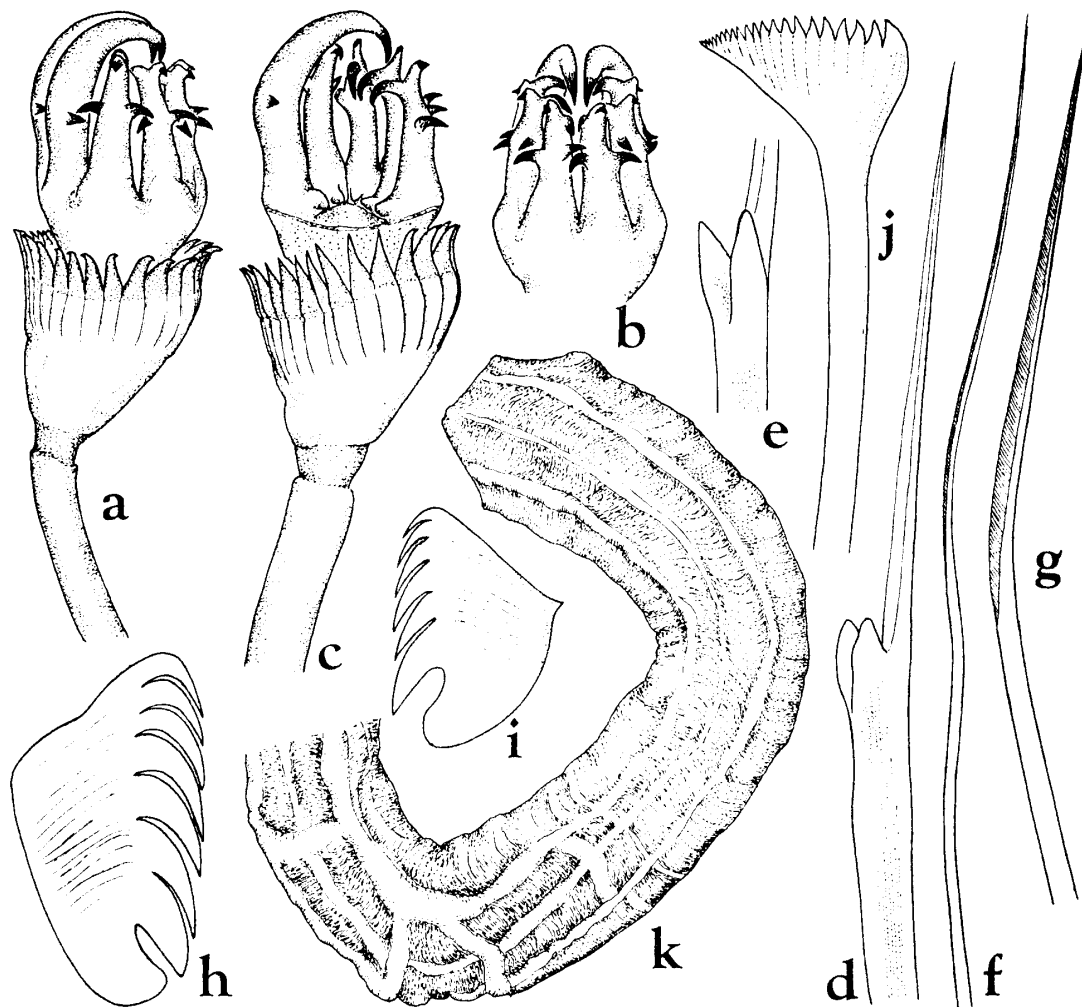


Fig. 3. *Hydroides externispina* STRAUGHAN. a. Operculum, $\times 40$; b. Opercular crown, in ventral view, $\times 40$; c. Operculum, half of the crown removed, $\times 40$; d, e. Collar setae, $\times 230$; f. Capillary collar seta, $\times 185$; g. Thoracic seta, $\times 345$; h. Thoracic uncinus, $\times 1200$; i. Abdominal uncinus, $\times 1200$; j. Abdominal seta, $\times 1200$; k. Tube, $\times 25$.

moderately long pinnule-free filaments. The collar is trilobed, with one ventral lobe and paired latero-dorsal ones.

The opercular funnel has 24 to 27 outwardly curved, sharply pointed radii; they are brownish. The opercular crown has 8 spines, including 2 large spines curved over the others. All spines have a pair of outwardly curved, darkish lateral hooks at about two-thirds of their length. The six spines have a distinct terminal hook pointing outwards and a nearly terminal one pointing downwards and inwards. They also have a small basal radial spine (Figs. a, b, c).

The thorax has 7 segments, 6 of which are uncinigerous. The collar setae are of two types: bayonet-shaped setae with two large, conical teeth at the base of the smooth blade (Figs. d, e) and fine limbate capillaries (Fig. f). The remaining thoracic setae are limbate capillaries (Fig. g); the thoracic uncini have 6 to 7 teeth, of which the most anterior tooth is the largest (Fig. h). The abdominal uncini are smaller than those of the thorax, and have 5 to 6 teeth (Fig. i); abdominal trumpet-shaped setae have about 20 teeth in one row distally (Fig. j).

The tube is white; it is thick sub-trapezoidal to semi-circular in cross-section with three longitudinal ridges (Fig. k).

The species is new to the Japanese fauna.

Distribution. Heron Island, Australia; Japan.

***Hydroides exaltata* (MARENZELLER, 1884)**

(Fig. 4, a-j)

Eupomatus exaltatus MARENZELLER, 1884, p. 217, pl. 4, fig. 3; WILLEY, 1905, pp. 312-313, pl. 7, fig. 182; PIXELL, 1913, pp. 77-78, pl. 8, fig. 4; IMAJIMA & HARTMAN, 1964, p. 368.

Hydroides (Eupomatus) exaltatus: AUGENER, 1914, pp. 142-144.

Hydroides exaltata: FAUVEL, 1953, p. 461; DEW, 1959, pp. 27-28, fig. 6A; PILLAI, 1960, pp. 10-12, text-fig. 4, A-E; STRAUGHAN, 1967a, p. 220.

Material examined. Sumiyoshi (1), Akisano (1) underside of corals on reef; Urata, on shell of pearl-oyster, *Pinctada margaritifera* (6); off Nishinoomote Harbour, in 30 m (11).

Description. The largest specimen is about 20 mm in length, including branchiae, and 1.5 mm in width in the thorax; it consists of about 100 segments, including the thoracic ones.

The branchiae have 15 to 16 gill-radioles on either side; each gill-radiole is not connected by a thin webbed membrane. The peduncle arises from the left or right base of the branchial lobe. The collar has three lobes, the latero-dorsal ones and one ventral one.

The opercular funnel has 25 to 28 marginal radii with pointed tips, curved outwards. The opercular crown has 6 to 9 spines, including a large dorsal spine. Each of the small spines is directed outwards, and the most dorsal spine is much larger and sickle-shaped with a curved terminal hook. All spines have a small basal radial spine (Figs. a, b).

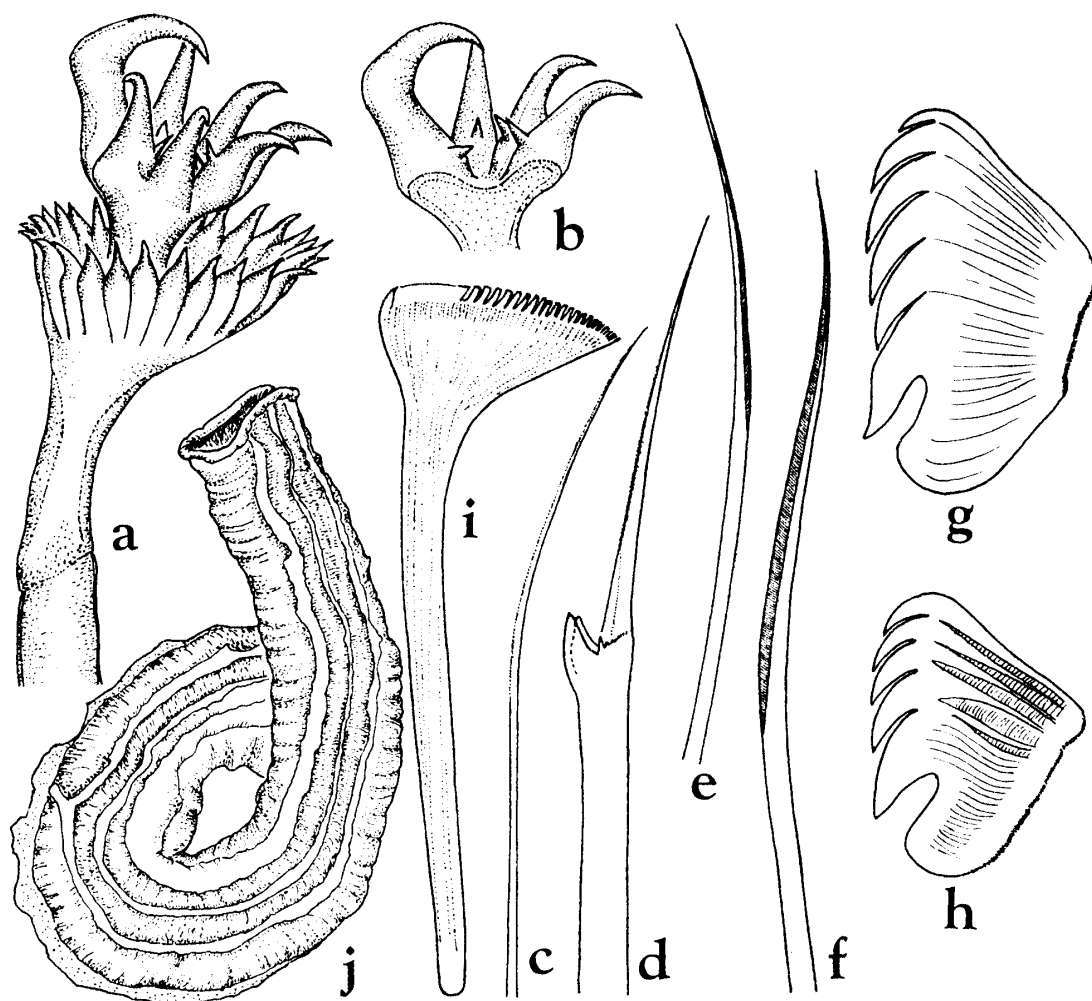


Fig. 4. *Hydroides exaltata* (MARENZELLER). a. Operculum, $\times 30$; b. Operculum, half of the crown removed, $\times 30$; c. Capillary collar seta, $\times 265$; d. Bayonet-shaped collar seta, $\times 195$; e, f. Thoracic setae, $\times 265$; g. Thoracic uncinus, $\times 1280$; h. Abdominal uncinus, $\times 1280$; i. Abdominal seta, $\times 1080$; j. Tube, $\times 7$.

The thorax has 7 segments, 6 of which are uncinigerous. The collar setae are two types: fine smooth capillaries (Fig. c) and bayonet-shaped setae with two conical teeth at the base of the minutely serrated blade (Fig. d); each fascicle has one or two bayonet-shaped setae with only one conical tooth. The remaining thoracic setae are limbate capillaries (Figs. e, f); the uncini have 6 to 7 teeth, the most anterior tooth is the largest (Fig. g). The abdominal uncini are similar to those of the thorax, with 5 to 6 teeth (Fig. h). The abdominal setae are trumpet-shaped distally, with about 25 minute teeth in one row (Fig. i).

The tube is white, thick; it is sub-trapezoidal in cross-section with three low longitudinal ridges and many growth rings (Fig. j). It is 3 mm in diameter near the mouth.

The species has been originally reported from Eno-shima, Kanagawa Pref. by MARENZELLER (1884).

Distribution. Japan; W. and E. Australia; Sri Lanka (Ceylon); Red Sea; Solomon Is.

Hydroides minax (GRUBE, 1878)

(Fig. 5, a-j)

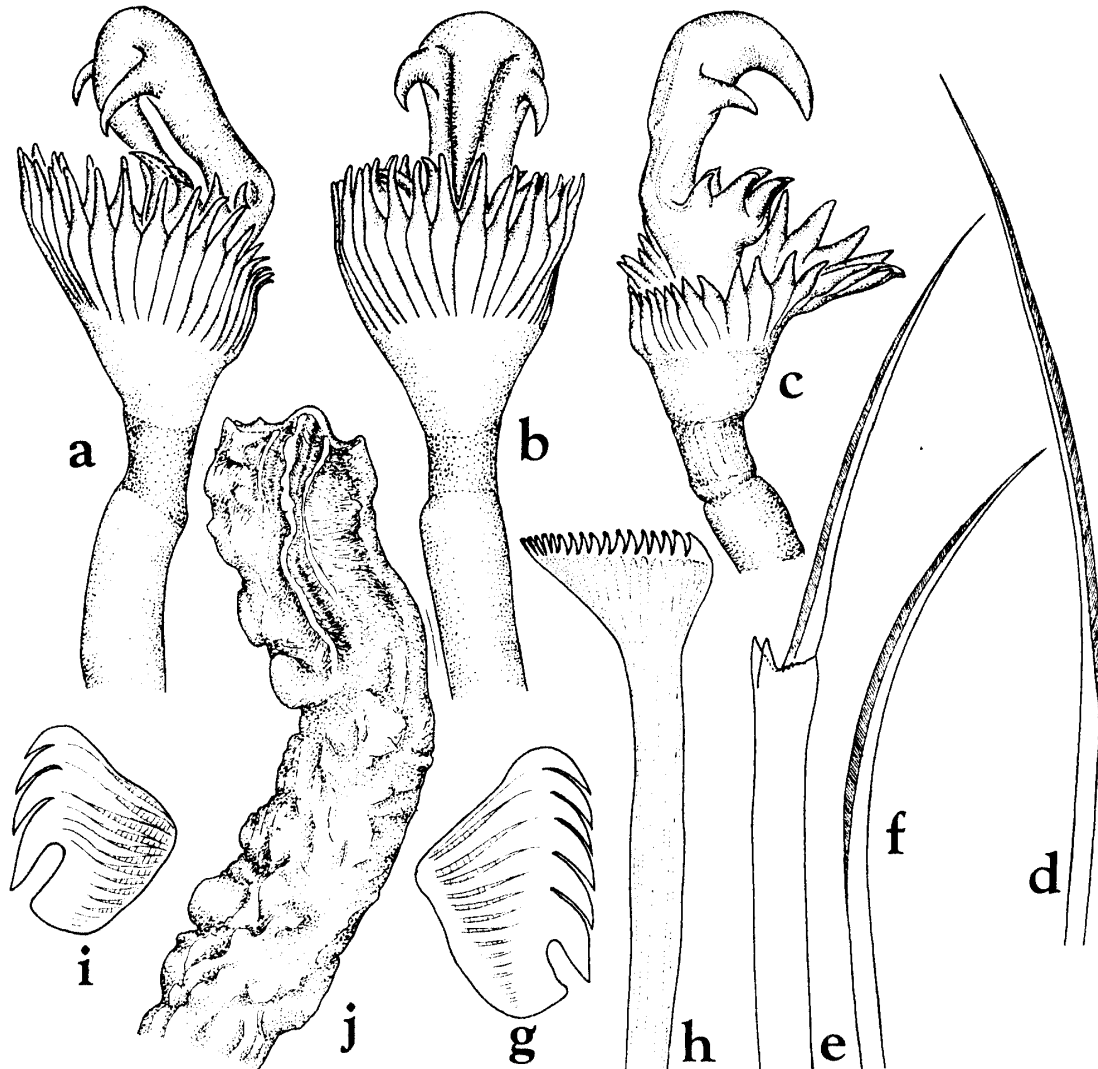
Serpula minax GRUBE, 1878, p. 269, pl. 15, fig. 5.*Eupomatus minax*: WILLEY, 1905, p. 314.*Serpula* (*Hydroides*) *monoceros* GRAVIER, 1908, pp. 115-117, fig. 467-472, pl. 8, fig. 288.*Hydroides monoceros*: PIXELL, 1913, p. 76; FAUVEL, 1953, p. 460, fig. 241, g; DAY, 1967, p. 808, fig. 38.4. o-p; STRAUGHAN, 1967a, p. 221, fig. 6(n); 1967b, p. 31; PILLAI, 1971, pp. 110-112, fig. 7, D.*Hydroides minax*: FAUVEL, 1953, p. 460, fig. 241, f; PILLAI, 1960, pp. 8-10, textfig. 3, A-E; 1971, p. 110; GIBBS, 1971, p. 202.*Material examined.* Urata, on shell of pearl-oyster, *Pinctada margaritifera* (4).

Fig. 5. *Hydroides minax* (GRUBE). a. Operculum, in lateral view, $\times 30$; b. The same, in ventral view, $\times 30$; c. Operculum from a different specimen, $\times 30$; d. Capillary collar seta, $\times 195$; e. Collar seta, $\times 195$; f. Thoracic seta, $\times 265$; g. Thoracic uncinus, $\times 900$; h. Abdominal seta, $\times 900$; i. Abdominal uncinus, $\times 900$; j. Tube, $\times 6$.

Description. The largest specimen is about 22 mm in length and about 1 mm in width in the thorax; it consists of 106 segments.

The branchiae have 16 gill-radioles on either side; each of the gill-radioles ends in a short, slender, pinnule-free filament; it has numerous pinnae along the axis. The collar is trilobed, with one ventral lobe and two latero-dorsal ones.

The operculum is the modified dorsalmost gill-radiole of the left side. The peduncle is smooth and cylindrical. The opercular funnel is oval, bilateral symmetrical and has 32 to 33 marginal radii, which gradually increase in size from the dorsal towards the ventral side of the funnel (Fig. a). The crown has 7 to 9 brown spines, including a large dorsal spine. Each of the small spines is directed outward and does not have accessory processes. The dorsalmost spine is much larger and stouter than the other ones; it is bent ventrally, its recurved terminal hook is directed towards the center of the crown (Fig. b), as well as the pair of lateral curved hooks (Fig. c).

The thorax has 7 segments; 6 of which are uncinigerous. The collar setae are of two types: fine limbate capillaries (Fig. d) and bayonet-shaped setae with two conical processes at the base of the smooth blade (Fig. e). The remaining thoracic setae are limbate capillaries (Fig. f); the thoracic uncini have 5 to 6 teeth (Fig. g), of which the most anterior tooth is the largest. The abdominal setae except some posterior segments are trumpet-shaped, with about 20 teeth in one row distally (Fig. h). The abdominal uncini are smaller than those of the thorax, and have about 4 to 5 teeth (Fig. k).

The tube is white; it is thick, sub-triangular in cross-section, with three serrated ridges; there is a median tooth-like projection over the entrance of the tube (Fig. j).

The species is new to the Japanese fauna.

Distribution. Philippines; Red Sea; Mocambique, Southern Africa; Indian Ocean; Sri Lanka (Ceylon); Havannah and Heron Islands, Australia; Solomon Islands; Gambia Is., French Polynesia; Japan.

***Hydroides fusca* sp. nov.**

(Fig. 6, a-i)

Material examined. Dredge sta. 22, in 80 m (1).

Description. A single incomplete specimen, lacking its posterior end, was collected from a sandy bottom. The body is slender; it is 11 mm in length, 0.7 mm in width in the thorax; 31 segments are still present.

The branchiae on either side have 10 gill-radioles, in addition there is an operculum on the left and a rudimentary operculum on the right. The peduncle is slender and cylindrical.

The opercular funnel has 20 outwardly curved, sharply pointed radii; the proximal half of the funnel is chocolate in colour, the tips of the radii are darkish. The opercular crown has 7 glossy black horny spines; all spines are equally sized, and end in a centrally directed recurved hook; there is an incurved prong on the inner side of the spine (Figs. a, b).

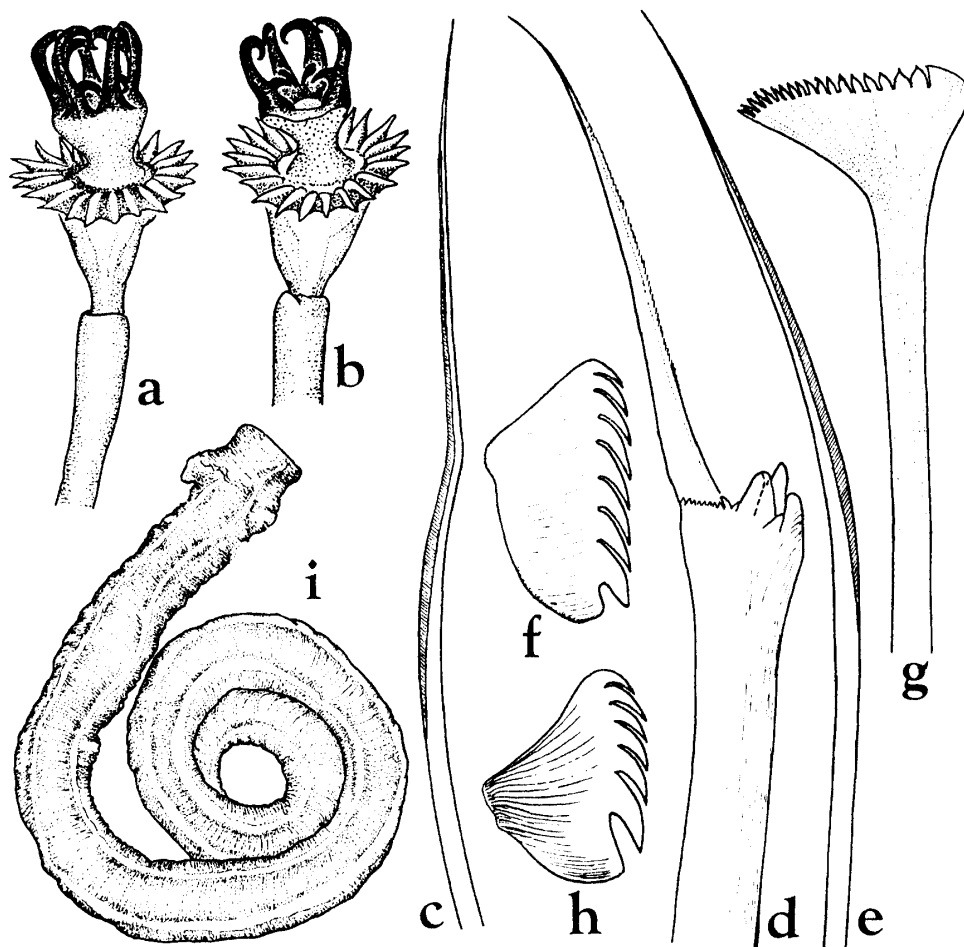


Fig. 6. *Hydroides fusca* sp. nov. a. Operculum, $\times 30$; b. Operculum, half of the crown removed, $\times 30$; c. Capillary collar seta, $\times 265$; d. Collar seta, $\times 370$; e. Thoracic seta, $\times 425$; f. Thoracic uncinus, $\times 1080$; g. Abdominal seta, $\times 1080$; h. Abdominal uncinus, $\times 1080$; i. Tube, $\times 7$.

The collar is yellowish white, and consists of one ventral lobe and two latero-dorsal ones. The thorax has 7 segments, 6 of which are uncinigerous. The collar setae are of two types: more or less geniculate limbate capillaries and bayonet-shaped setae with four large and two smaller teeth and a striated subapical zone (Figs. c, d). The remaining thoracic setae are limbate capillaries (Fig. e); the thoracic uncini have 7 to 8 curved teeth (Fig. f), of which the most anterior one is the largest. The abdominal setae are trumpet-shaped distally, prolonged towards one side, with about 20 teeth in one row (Fig. g); the abdominal uncini are slightly different from those of the thorax, with 6 to 7 teeth.

The tube is white; it is cylindrical and spirally coiled; it has two longitudinal ridges and many growth rings (Fig. i).

Remarks. *Hydroides fusca* is characterized by its opercular crown with seven black, centrally recurved spines, with an incurved prong on the inner side of the spine.

Holotype. NSMT-Pol. H 119.

Distribution. Japan.

***Hydroides tuberculata* sp. nov.**

(Fig. 7, a-j)

Hydroides brachyacantha: DEW, 1959, pp. 28–29, fig. 7 [not RIOJA]; STRAUGHAN, 1967a, p. 222.

Material examined. Urata, on shell of pearl-oyster, *Pinctada margaritifera* (4); Sumiyoshi, underside of corals of shore reef (1); off Nishinoomote Harbour, in 30 m (6); dredge stas. 6 (2), 14 (1).

Description. A large specimen in the holotype measures about 20 mm in length and about 0.8 mm in width in the thorax; it consists of 85 segments.

The collar is darkly pigmented latero-ventrally; it is continuous with the broad thoracic membranes, which end in a ventral back-flap posterior to the last pair of thoracic setigerous fascicles. The branchiae have seven gill-radioles on either side.

The operculum is the modified dorsalmost gill-radiole of the left side. The distal

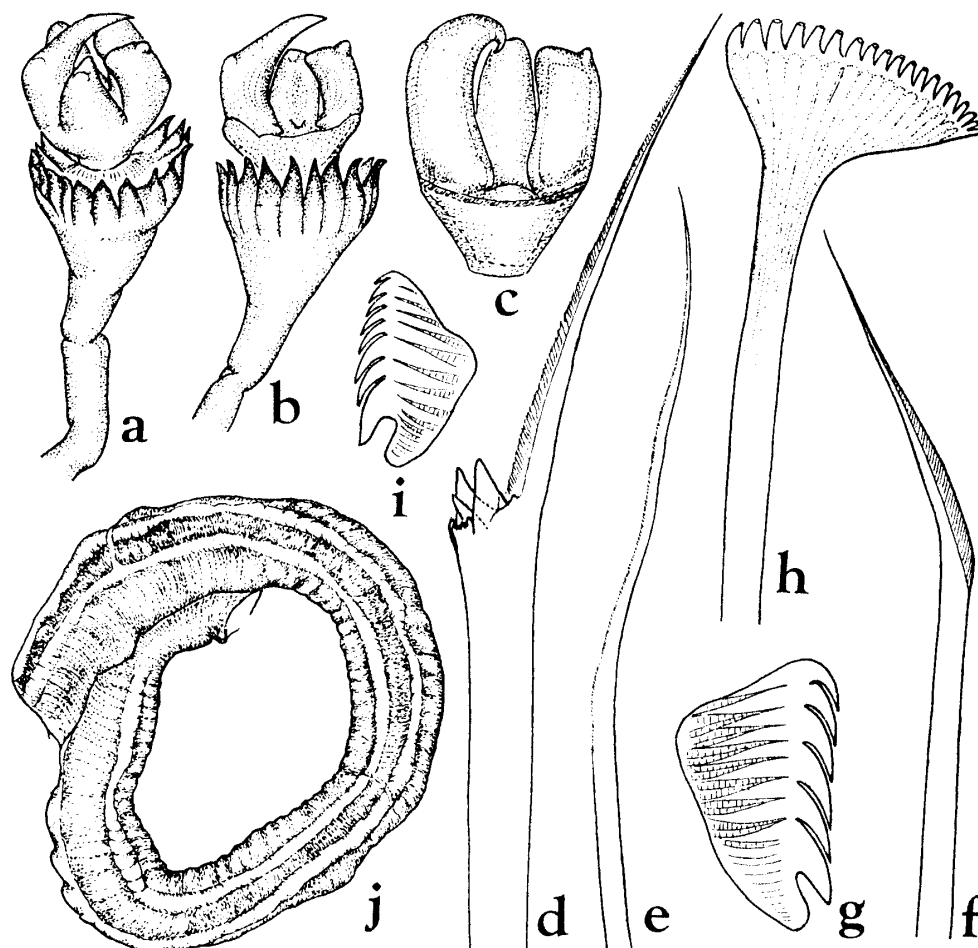


Fig. 7. *Hydroides tuberculata* sp. nov. a. Operculum, $\times 50$; b. Operculum, half of the crown removed, $\times 50$; c. Half of the opercular crown from a paratype, showing the most dorsal spine, $\times 50$; d. Collar seta, $\times 370$; e. Capillary collar seta, $\times 370$; f. Thoracic seta, $\times 510$; g. Thoracic uncinus, $\times 1280$; h. Abdominal seta, $\times 1960$; i. Abdominal uncinus, $\times 1280$; j. Tube, $\times 11$.

half of the opercular funnel and all spines of the crown are dark-brown in colour. The opercular funnel has 22 radii, which have pointed tips, curved outwards. The crown has five spines, with a thick cuticle (Fig. a). The dorsalmost spine is larger than the others; it has a longer (Fig. b) or shorter (Fig. c) distal end, curved inwards. The four remaining spines are concave nearly equally sized valves. Each spine of the crown has a small external swelling at its shoulder and a somewhat pointed accessory basal radial spine.

The collar setae are of two types: bayonet-shaped setae with two large conical teeth and some small accessory teeth at the base of the minutely serrated blade (Fig. d) and finely serrated capillaries (Fig. e). The remaining thoracic setae are limbate capillaries (Fig. f); the thoracic uncini have 6 to 8 teeth, the anteriormost tooth is the largest (Fig. g). Abdominal setae have short shafts and trumpet-shaped tips, with about 20 apical teeth in one row (Fig. h); the abdominal uncini have 5 to 8 teeth in one row (Fig. i).

The tube is white, sub-trapezoidal to semi-circular in cross-section, with two longitudinal ridges (Fig. j).

Remarks. *Hydroides tuberculata* resembles *H. perezii* FAUVEL, 1918 from the Iranian Gulf and Queensland, in its operculum, with broad, concave valves, and a dorsal hooked spine. However, in *H. tuberculata* these valves are concavely subrectangular with a small external swelling at the shoulder, seen in side-view, while the valves in *H. perezii* have a raised smooth border, and are half-way up connected by a membrane, forming pockets.

Type-series. Holotype, NSMT-Pol. H 120; 13 paratypes, NSMT-Pol. P 121.

Distribution. Japan; Australia.

***Hydroides albiceps* (GRUBE, 1870)**

(Fig. 8, a-v)

Serpula (Eupomatus) albiceps GRUBE, 1870, pp. 520–521.

Hydroides albiceps: STRAUGHAN, 1967a, p. 220, fig. 6 (m).

Material examined. Anno (6), Shimamazaki (25), Akisano (5), Sumiyoshi (5) underside of corals on reef; off Nishinoomote Harbour, in 30 m (2); Urata, on shell of pearl-oyster, *Pinctada margaritifera* (5); dredge sta. 2 (2), sta. 6 (32), sta. 9 (2), sta. 14 (8), sta. 16 (10), sta. 20 (7).

Description. Generally, individuals from the underside of corals on the shore reef were small or juvenile, and those collected by dredging in 45 to 70 m depths were large and mature. A specimen from Sta. 16, with many eggs in its tube, measures 30 mm in length, and 1.6 mm in width in the thorax; it consists of 115 segments.

The branchiae have 17 pairs of gill-radiolae; each gill-radiolae has a rather long, free end distally from 40 to 50 pairs of pinnulae. The opercular peduncle arises from the left side or the right side. There is a rudimentary operculum at the opposite side. The peduncle is smooth and cylindrical. The collar has three lobes, the latero-dorsal ones are large and associated with the collar setae.

The marginal radii of the opercular funnel number 28 to 34, their tips are club-shaped

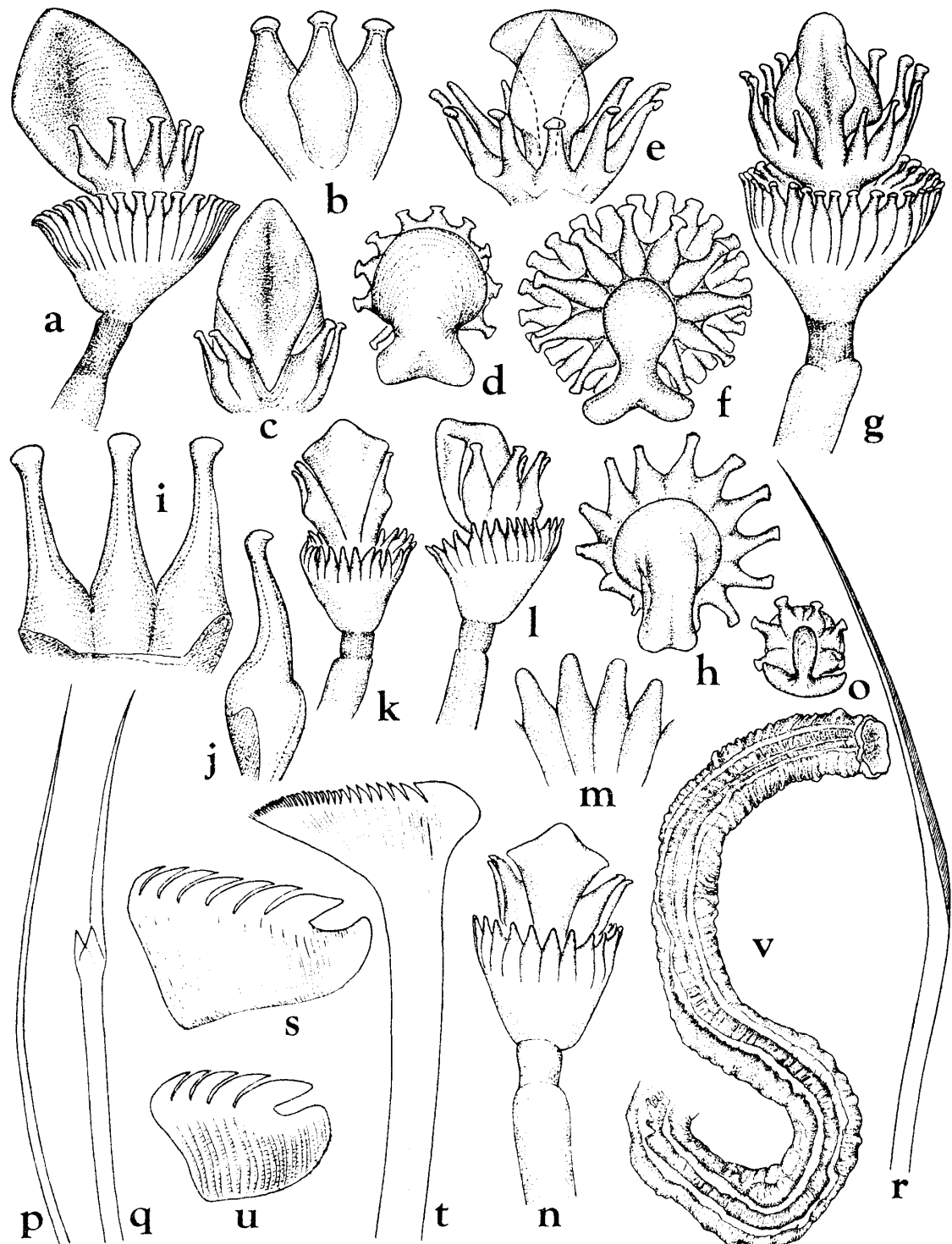


Fig. 8. *Hydroides albiceps* (GRUBE). a. Operculum, $\times 27$; b. Three marginal radii of opercular funnel, $\times 60$; c. Same operculum, in ventral view, $\times 27$; d. Same from above, $\times 27$; e. Opercular crown from a different specimen, in ventral view, $\times 30$; f. Entire operculum of same from above, $\times 27$; g. Operculum of third specimen, $\times 27$; h. Same from above, $\times 27$; i. Three crownal spines from above, $\times 60$; j. Same, in lateral view, $\times 60$; k. Operculum from juvenile specimen, in dorsal view, $\times 35$; l. Same, in lateral view, $\times 35$; m. Part of opercular funnel from same juvenile from above, $\times 95$; n. Operculum from an other juvenile specimen, $\times 35$; o. Opercular crown from first juvenile specimen from above, $\times 35$; p. Capillary collar seta, $\times 110$; q. Collar seta, $\times 110$; r. Thoracic seta, $\times 230$; s. Thoracic uncinus, $\times 780$; t. Abdominal seta, $\times 780$; u. Abdominal uncinus, $\times 780$; v. Tube, $\times 6$.

with semi-circular frontal margins (Figs. a, b). The opercular crown consists of a stout, vesicular dorsal spine and 10 to 14 slender spines. The dorsal spine is globular towards the centre of the crown; it has two dorso-lateral enlargements, separated by a longitudinal groove (Figs. c, d). These dorso-lateral enlargements are variable in shape: plectrum-shaped in ventral view (Fig. e) and V-shaped with long arms in frontal view (Fig. f), or subrectangular with lateral swellings in ventral view (Fig. g) and V-shaped with short arms in frontal view (Fig. h). The remaining 10 to 14 spines of the crown are elongated bottle-shaped, with a semi-circular anterior margin and a short neck-like constriction (Figs. i, j).

The form of the operculum varies with the state of growth or maturity of the animals. In a juvenile individual, measuring 7.5 mm by 0.8 mm, the opercular funnel has 20 to 24 marginal radii with blunt tips, not expanded laterally (Figs. k, l, m, n). The opercular crown has 7 to 9 erect spines. The dorsalmost spine has three lobes; the latero-dorsal lobes are fanwide expanded (Figs. k, n) and the medio-ventral lobe is protruding at a right angles to the latero-dorsal ones; as a result, it is T-shaped in frontal view (Fig. o). This agrees closely with STRAUGHAN's figure 6 (m). The 6 to 8 remaining spines of the crown are slightly curved outwards and end in a laterally expanded lobe (Fig. o).

The thorax has 7 segments, 6 of which are uncinigerous. The collar setae are of two types: fine smooth capillaries (Fig. p) and bayonet-shaped setae with two conical teeth at the base of the smooth blade (Fig. q). The remaining thoracic setae are limbate capillaries (Fig. r); the thoracic uncini have 7 to 8 teeth, the anteriormost is the largest (Fig. s). Abdominal setae are trumpet-shaped distally, with about 30 minute teeth in one row, the proximal tooth is larger than the remaining ones (Fig. t). The abdominal uncini are similar to those of the thorax, but are smaller, with 5 to 6 teeth (Fig. u).

The tube is white, sub-trapezoidal in cross-section with two or three longitudinal ridges; it is 3 mm in diameter near the mouth (Fig. v).

Remarks. *Hydroides albiceps* resembles *H. trivesiculosus* STRAUGHAN, 1967, from Heron Island, Australia, and *H. ancorispina* PILLAI, 1971 from Sri Lanka in having laterally expanded marginal radii and spines in the operculum, and the bulbous, dorsal spine of the crown. However, it is distinguished by the shape of the bulbous, dorsal spine and the number of remaining spines of the crown, and in the form of the marginal radii of the funnel.

Distribution. Red Sea; Japan; Australia.

***Pomatoleios kraussii* (BAIRD, 1865)**

Pomatoleios crosslandi: OKUDA, 1937, pp. 64–67, pl. 2, fig. 1, textfigs. 11, 12; 1940, pp. 22–23; PILLAI, 1960, pp. 15–17, text-fig. 6, A-D.

Pomatoleios kraussii: DAY, 1955, p. 449; IMAJIMA & HARTMAN, 1964, p. 372; DAY, 1967, pp. 800–801, fig. 38.3. a-f; STRAUGHAN, 1967a, p. 235; IMAJIMA, 1968, p. 34.

Material examined. Anno, Shimamazaki, Kumanoura, Akisano, Sunozaki, Sumiyoshi underside of corals on reef.

The species is common on the coasts of Honshu, Shikoku and Kyushu; it forms a

densely populated belt in sheltered areas in the littoral region.

Distribution. Indian Ocean; Red Sea; South Africa; Australia; Sri Lanka (Ceylon); Japan.

***Spirobranchus giganteus corniculatus* (GRUBE, 1862)**

(Fig. 9, a-p)

Spirobranchus giganteus: FAUVEL, 1936, pp. 87-89; STRAUGHAN, 1967a, pp. 245-246, fig. 14 (e); IMAJIMA, 1968, p. 39; [not *S. giganteus* IMAJIMA & HARTMAN, 1964, p. 373]

Spirobranchus giganteus corniculatus: ten HOVE, 1970, pp. 24-32, figs. 63-73, pl. 2, c.

Material examined. Anno, Akisano, Urata, Sumiyoshi, Kumanoura, Shimamazaki, in aggregated masses on reef.

Description. The largest specimen measures 55 mm in length, including the branchiae, and about 6 mm in width in the thorax; it consists of 173 segments.

The branchiae protrude as two cones from the entrance of tube (Fig. a); the gill-radioles are arranged in spiral of 4 to 10 whorls, and they are connected for about one-third length by a thin webbed membrane; there are no processes between the filaments.

The peduncle is inserted nearly middorsally, and is somewhat flattened, with a pair of broad, lateral wings with entire edge; wings are elongated oval, long to short owing to the various developmental stages. The opercular basal disc is calcareous, circular or pear-shaped, and is usually excavate at the posterior margin. The upper surface of the opercular disc has a group of branched spines originating from one common base. The latero-dorsal spines have a smaller secondary dorsal tine and a few small side-spines; the medio-ventral spine is simple or has a furcate tip (Figs. b, c, d, e). In juvenile individuals the opercular disc is circular, and three simple horns without side-spines arise from a elevated, broad base (Figs. f, g).

The collar is well developed, and divided into two small lateral lobes and one larger ventral lobe that appear to be triangular. Thoracic membranes are very wide and continued posteriorly as a broad ventral back-flap. The bundle of collar setae is very small; it contains two types of setae: bayonet-shaped ones with a toothed projection at the junction with the main shaft, their distal part fringed with many fine hair-like processes (Figs. h, i), and limbate capillaries covered with fine hair-like processes along one edge (Fig. j). The remaining thoracic setae are limbate capillaries (Fig. k). Thoracic uncini are sub-rectangular, with 12 to 15 teeth; the anterior one is large and gouge-shaped (Figs. l, m). Abdominal setae are finely serrated geniculate, terminating in a long fine point (Fig. n). Abdominal uncini are sub-triangular and have 9 to 10 curved teeth (Fig. o).

The tube is white and thick and has a very prominent median tooth, projecting over the entrance; it consists of heart-shaped units arranged in a series, but most tubes are covered by foreign materials (Fig. p).

Remarks. The subspecies is closely allied to the stem form, *Spirobranchus giganteus giganteus*, but may be differentiated from it in having a more simple operculum, as mentioned by ten HOVE (1970).

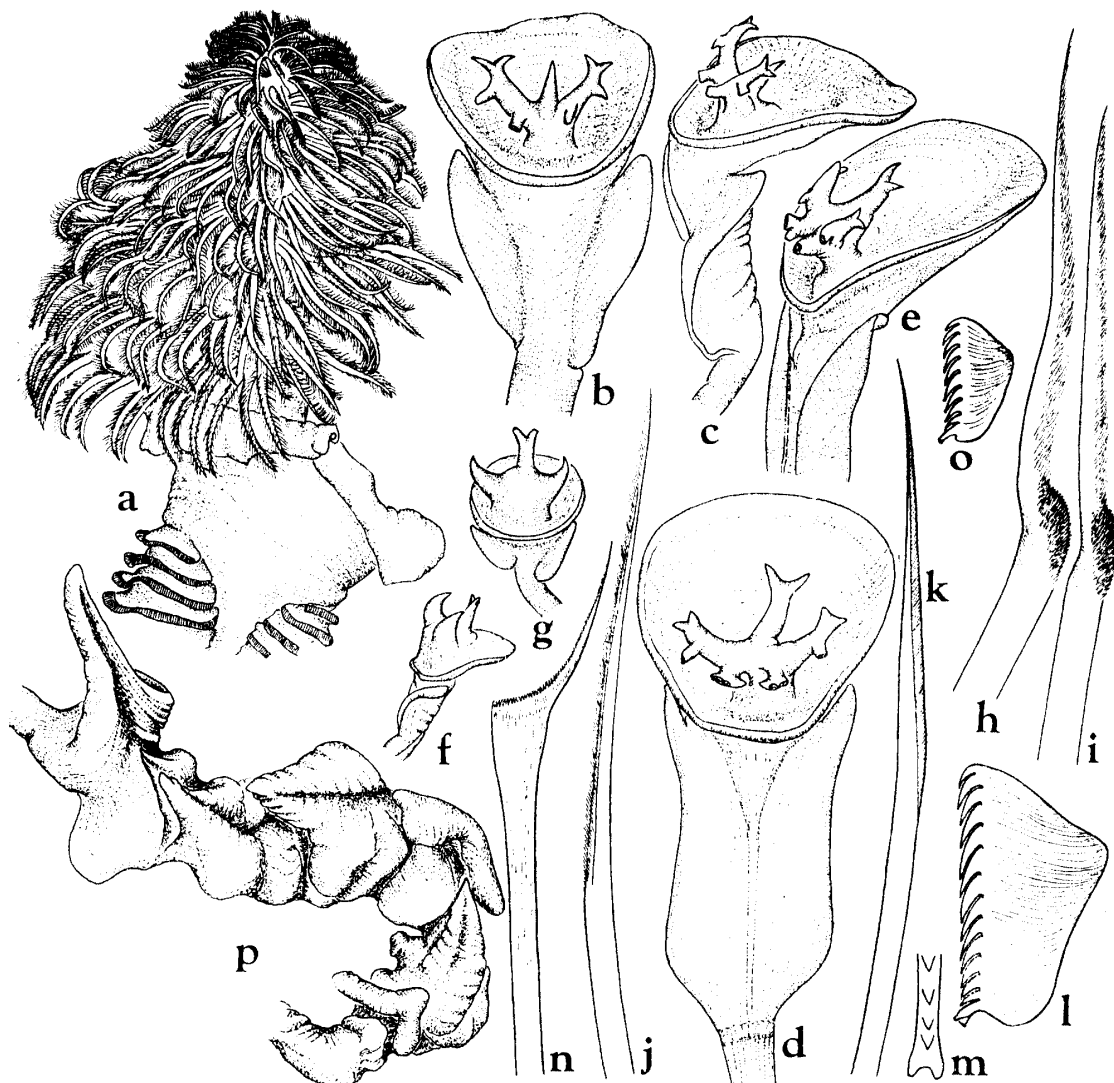


Fig. 9. *Spirobranchus giganteus corniculatus* (GRUBE). a. Branchia and anterior thorax, left branchia omitted, in ventral view, $\times 3$; b. Operculum, in dorsal view, $\times 4$; c. The same, in lateral view, $\times 4$; d. Operculum from a different specimen, in dorsal view, $\times 4$; e. The same, in lateral view, $\times 4$; f, g. Opercula from juvenile specimens, $\times 4$; h, i. Bayonet-shaped collar setae $\times 200$; j. Capillary collar seta, $\times 200$; k. Thoracic seta, $\times 150$; l. Thoracic uncinus, $\times 320$; m. The same, in frontal view, $\times 810$; n. Abdominal seta, $\times 320$; o. Abdominal uncinus, $\times 320$; p. Tube, $\times 2.5$.

Distribution. Indian Ocean; Malaysian Archipel; Philippines; southern Pacific Islands; N. Eastern Australia; Japan.

***Spirobranchus latiscapus* MARENZELLER, 1884**

Pomatostegus latiscapus MARENZELLER, 1884, pp. 218–219, pl. 4, fig. 5; MOORE & BUSH, 1904, pp. 173–174; TAKAHASHI, 1938, pp. 215–216, textfig. 16.

Spirobranchus latiscapus: FAUVEL, 1936, p. 89; IMAJIMA & HARTMAN, 1964, pp. 373–374.

Material examined. Dredge sta. 2 (1), sta. 6 (3), sta. 16 (4), sta. 20 (1).

The tube is yellowish red, triangular in cross-section, and has medial and lateral longitudinal keels, which are roughly serrated. The operculum has 3, 4 and 7 tiers of calcareous distal discs piled close together and concave between successive discs.

Distribution. Japan.

***Metavermilia acanthophora* (AUGENER, 1914)**

(Fig. 10, a-k)

Vermiliopsis acanthophora AUGENER, 1914, pp. 155–158, pl. 1, figs. 21–24; DEW, 1959, p. 32, fig. 9A-E; STRAUGHAN, 1967a, p. 234.

Metavermilia acanthophora: ten HOVE, 1975, p. 57.

Material examined. Dredge sta. 2 (1), sta. 6 (2), sta. 16 (2), sta. 20 (2).

Description. The largest specimen measures 24 mm in length, including the branchiae, and about 2 mm in width in the thorax; it consists of 145 segments. The gill-radioles arise from paired lobes, inserted dorsally, and have a pectiniform arrangement. They number 20 to 27 on either side and are not connected by a branchial membrane; all gill-radioles end distally in enlarged clavate tips. The second dorsal radiole on the right side is transformed into a large flat, ribbonlike opercular stalk, and wingless.

The operculum is differentiated into two distinct parts: a proximal soft, globular part and a distal, yellow-brown horny part. The latter is composed of 2 to 5 similar and parallel tiers; these tiers are unequally developed, the margin of the proximal one is depressed or notched middorsally (Figs. a,b). However, some opercula lack tier completely (Fig. c). A single spine arises from the centre of the terminal tier or from the proximal, globular part; usually it is bent dorsally.

The collar is large and divided into three regions: an unpaired triangular medio-ventral flap and paired rounded latero-dorsal lobes. The latter are continuous with the thoracic membranes and end just posterior to the sixth uncinigerous segment.

The thorax has 7 segments, of which 6 are uncinigerous. The small fascicles of collar setae contain only a few setae of two types: capillaries and limbate setae (Figs. d,e). The following thoracic setae are similar to those of the collar, in addition, “sickle” setae (“*Apomatus*-setae”) with a denticulate blade and a slightly limbate proximal zone are present from setiger 3 onwards (Figs. f,g). Thoracic uncini have 11 to 13 teeth in one row (saw-shaped uncini) (Fig. h). Abdominal uncini are similar to the thoracic ones, with 8 to 10 teeth (Fig. i). Abdominal setae are geniculate, and have a rather long and narrow triangular blade; they are replaced by long capillary setae in the about 20 posterior-most segments (Fig. j).

The tube is white, and has 5 to 9 irregular denticulate crests or keels (Fig. k).

The species is new to the Japanese fauna.

Remarks. According to ten HOVE (1975, pp. 58, 59, 69) most of the *Vermiliopsis acanthophora* sensu auct, belongs to different species. The material of the above given synonymy has been studied, and indeed is conspecific (ten HOVE, pers. comm.).

Distribution. Western and eastern Australia; Japan.

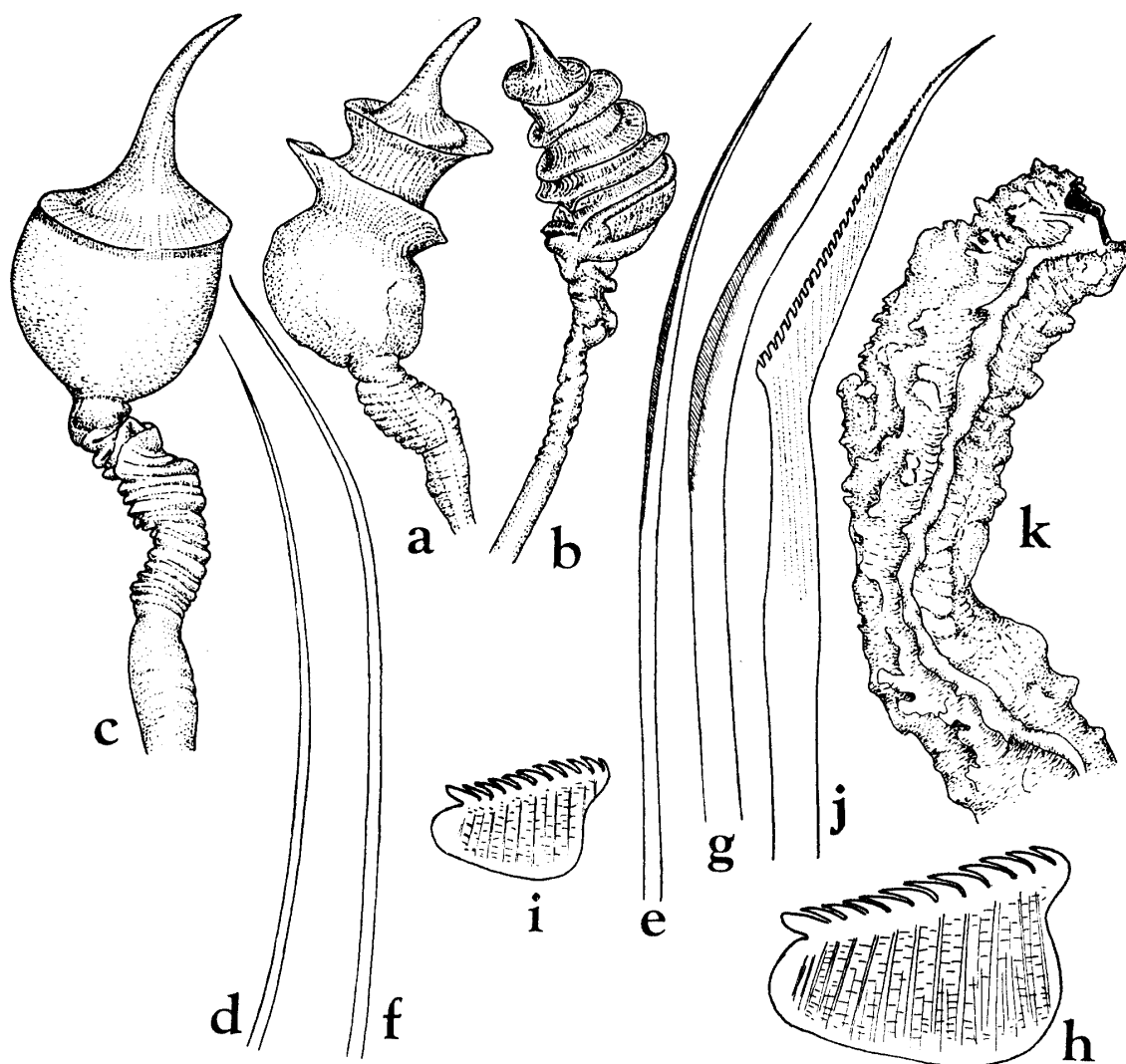


Fig. 10. *Metavermilium acanthophora* (AUGENER). a. Operculum with two tiers, $\times 23$; b. Operculum with five tiers, $\times 7$; c. Operculum without tier, $\times 10$; d, e. Collar setae, $\times 130$; f. Thoracic seta, $\times 130$; g. Thoracic "Apomatus-seta", $\times 270$; h. Thoracic uncinus, $\times 425$; i. Abdominal uncinus, $\times 425$; j. Geniculate abdominal seta, $\times 790$; k. Tube, $\times 4$.

***Vermiliopsis infundibulum glandigera*-group**

(Fig. 11, a-o)

Vermilia pluriannulata MOORE & BUSH, 1904, pp. 171-173, pl. 12, figs. 26-32, 45; pl. 11, fig. 19.

Vermilia ctenophora MOORE & BUSH, 1904, pp. 169-171, pl. 12, figs. 21-25.

Vermiliopsis glandigerus GRAVIER, 1908, p. 121, pl. 8, figs. 290-291; FAUVEL, 1953, p. 467, fig. 242, k.

Vermiliopsis ctenophora: TAKAHASHI, 1938, pp. 216-217, pl. 20, G; textfig. 17; IMAJIMA & HARTMAN, 1964, p. 374.

Vermiliopsis pluriannulata: IMAJIMA & HARTMAN, 1964, pp. 374-375.

Vermiliopsis infundibulum: STRAUGHAN, 1967b, p. 35; 1967a, pp. 233-234; ZIBROWIUS, 1968, pp. 121-124, pl. 2, figs. 30-33; pl. 3, figs. 1-15; pl. 14, fig. b.

Material examined. Anno (3), Shimamazaki (2), Akisano (2), Sumiyoshi (1) underside of corals on reef; dredge sta. 2 (1), sta. 4 (5), sta. 6 (15), sta. 14 (2), sta. 20 (4).

Description. The largest specimen measures 25 mm in length including branchiae, and 2.0 mm in width in the thorax; it consists of 109 segments.

The branchiae arise from paired lobes. The 18 to 19 pairs of gill-radioles have a circular arrangement; they are not connected by a branchial membrane. The distal end of the gill-radioles is short, elliptical (Figs. a, b).

The opercular peduncle is slightly compressed dorso-ventrally; it is regularly annulated. It is inserted to the left at the base of the branchial lobe, just below and between the first and second normal filament. The operculum has a fleshy bulbous part and a chitinized terminal cap, with several dark brown rings. The terminal cap is variable in shape; it may be elongate conical, cylindrical with a horn distally, or be a high dome with 3 to 16 internal rings (Figs. c-g).

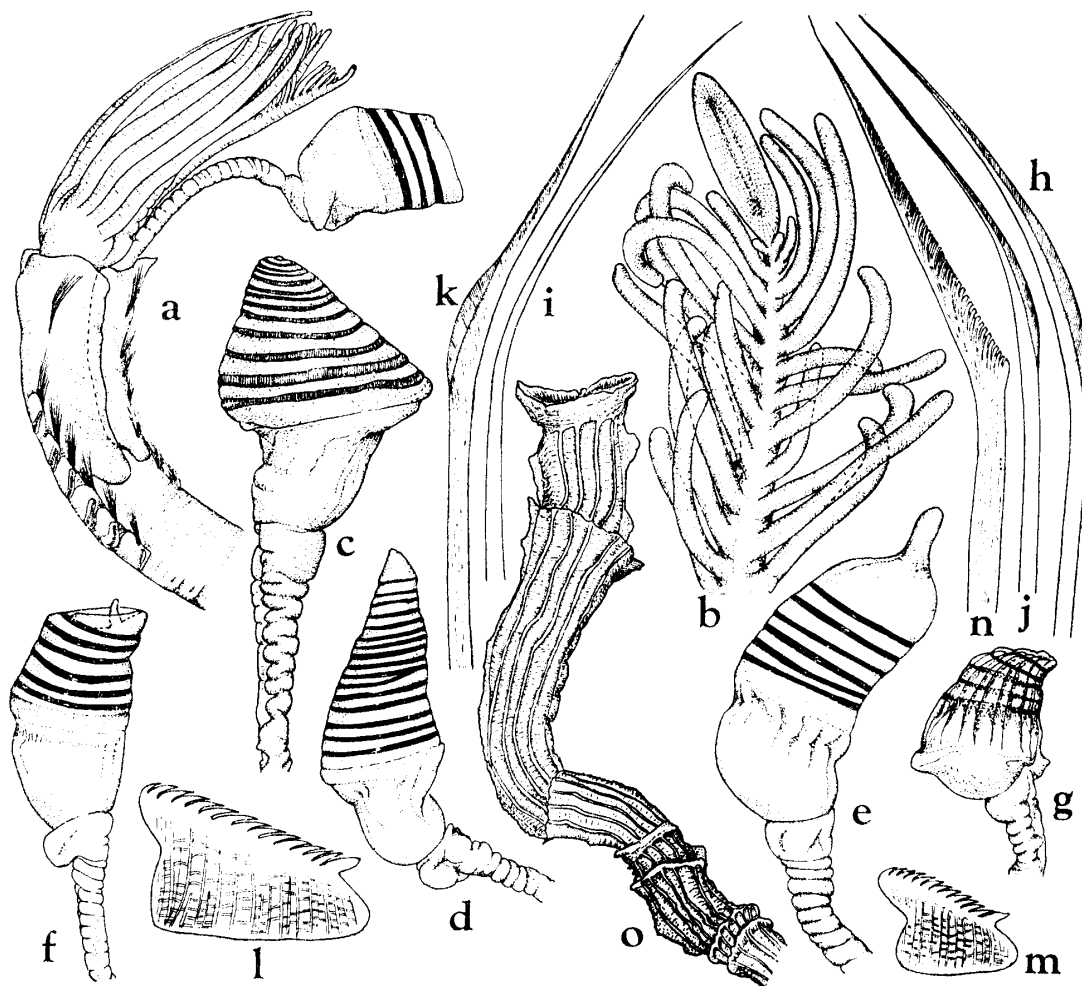


Fig. 11. *Vermiliopsis infundibulum glandigera*-group. a. Anterior end of worm, in latero-dorsal view, $\times 14$; b. Distal end of gill-radiole, $\times 80$; c-g. Various types of opercula, c-f, $\times 15$, g, $\times 13$; h, i. Collar setae, $\times 200$; j. Thoracic limbate seta, $\times 200$; k. Thoracic "Apomatus-seta", $\times 200$; l. Thoracic uncinus, $\times 485$; m. Abdominal uncinus, $\times 485$; n. Geniculate abdominal seta, $\times 485$; o. Tube, $\times 3.5$.

The collar has an entire margin; it is divided into an unpaired medio-ventral triangular flap and paired rounded latero-dorsal lobes. These lobes are continuous with the thoracic membranes and end just posterior to the third row of uncini or setiger 4 (Fig. a).

The thorax has 7 segments, 6 of which are uncinigerous. The bundles of collar setae are of equal size as the following bundles and contain setae of two types: limbate setae (Fig. h) and plain capillaries (Fig. i). The following bundles have limbate setae (Fig. j); "Apomatus-setae" occur from setiger 3 onwards (Fig. k). The thoracic uncini have a single row of 15 to 17 teeth, the anteriormost tooth is simple (Fig. l). The abdominal uncini are about half the size of the thoracic ones, with 13 to 14 teeth including the anterior simple one (Fig. m). The abdominal setae are geniculate, with a coarsely denticulate edge (Fig. n).

The tube is white; it is semi-circular in cross-section, and has 4 to 6 slender longitudinal ridges and some flaring "peristomes" encircling the tube (Fig. o).

Distribution. Circum (sub-) tropical.

***Serpula vermicularis* LINNAEUS, 1767**

Serpula vermicularis: USCHAKOV, 1955, pp. 424-425, fig. 160, A-E; IMAJIMA & HARTMAN, 1964, pp. 372-373; STRAUGHAN, 1967a, p. 206, fig. 3 (a); DAY, 1967, pp. 809-810, fig. 38.5. a-h; IMAJIMA, 1968, p. 39; IMAJIMA & HAYASHI, 1969, p. 6.

Material examined. Dredge sta. 2 (1), sta. 14 (1), sta. 20 (1).

Distribution. Cosmopolitan (?).

Zoogeography

The currents in the equatorial region of the Pacific are represented by the North and South Equatorial Currents flowing westwards, and between them the Equatorial Countercurrent flowing eastwards; the North Equatorial current flows northwards along the Ryukyu Islands and along the southern shelflands of Japan as the warm Kuroshio Current. Accordingly, the areas around the island Tanega-shima are sub-tropical and share some of the characteristics of the Indo-Pacific and Philippine faunas.

However, most of the 13 serpulid species, mentioned in this study, are also known from eastern Australia, with the exception of *Hydroides fusca* and *Spirobranchus latiscapus*. This marked faunistic similarity may have been caused by the complex currents between Australia and the Asian mainland or have been caused by previous geographical conditions in the area.

要 約

西南日本外帯の自然史科学的総合研究の一環として、種子島ならびにその周辺海域で磯採集とドレッジによる海産無脊椎動物相の調査がおこなわれ、採集された多くの動物のうちから、多毛環虫類のカンザシゴカイ科 (Serpulidae) の種類が研究された。カンザシゴカイ類は石灰質の管を作って、石、貝殻、また

は死んだイシサンゴ類などの上に付着して生息するものであって、この類は種子島周辺海域からは今まで何ら報告がなかった。

このたびの研究で明らかにされた6属, 13種には2新種, *Hydroides fusca*, *Hydroides tuberculata* と5日本新記録種 *Hydroides tambalagamensis*, *H. externispina*, *H. minax*, *H. albiceps*, *Metavermilina acanthophora* が含まれる。また、暖海域に普通にみられる *Spirobranchus giganteus* は、殻蓋の形態上から *Spirobranchus giganteus corniculatus* にされた。*Hydroides* 属についてみると、報告された7種のうち、既知種の *Hydroides exaltata* を除いた6種が日本の動物相に新たに追加された。

種子島周辺海域は北赤道海流に源を発する黒潮に支配されているので、一般にインド・マレー群島水域やフィリッピン海産動物相と近似しているとされている。しかし、ここに研究された13種類のうち、*Hydroides fusca* と *Spirobranchus latiscapus* の2種を除いた11種類は、北赤道海流の一部が反転して東流する赤道反流を越え、さらに南方のオーストラリア海域から見出されていて、両海域でのこの類の近似性が非常にたかいということが解った。

海産動物は海流や船底に付着して運ばれ、分布が拡るものであるが、この他に第三紀の海陸分布や地形なども影響して、種子島周辺とオーストラリア海域の動物相が近似しているものと考えられる。

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